great epeirogenic movements, perhaps more interesting than those of any other part of the world in such late geologic periods.

Dr. J. F. Whiteaves, Paleontologist of the Canadian Geological Survey, Ottawa, Canada, was elected to be the Vice-President for Section E, and Professor Arthur Hollick, of Columbia University, New York City, to be its Secretary, in the Association meeting at Columbus, Ohio, next year. Geology is also represented in the election of Professor Edward Orton, of Columbus, to be the President of that meeting.

Warren Upham,
Secretary of Section E, 1898.

NOTES ON INORGANIC CHEMISTRY.

The presidential address of Sir William Crookes before the British Association at Bristol this year was concerned with two themes. The first of these was the world's wheat supply and how it can be increased. Not only is Great Britain unable to raise her own wheat supply, but the wheat-producing area of the world is being so rapidly taken up that by 1931 the world will be unable to raise enough for consumption, and the immediate prospect will be a wheat famine. This can be obviated only by increasing the wheat crop per acre, that is by using fertilizers to a much greater extent than is at present the case. The chief fertilizer needed is combined nitrogen. The Chili saltpeter now extensively used is brought from northern Chili, but if used on all wheat land, the supply from the Chili mines would be exhausted in a very few years. Cultures of bacteria which assimilate atmospheric nitrogen have been tried as a fertilizer, but thus far with little success. The great desideratum is a process for the manufacture of sodium nitrate directly from the nitrogen of the air. With an indefinite supply of fertilizer the world's wheat yield can be doubled with little increase of acreage. This would tide matters over till the latter part of the twentieth century, when it may be hoped that the luxuriant vegetable growth of the tropics will be utilized for food supply. At all events, the wheat famine would be postponed till the present generation has disappeared from active work. It may not prove impossible to solve the problem of 'fixing' atmospheric nitrogen even at the present time. In 1892 Professor Crookes exhibited at a Soirée of the Royal Society an experiment on the 'Flame of Burning Nitrogen.' Nitrogen will burn in oxygen if the heat of the ignition point can be maintained. This can be done by the electric current, and it is calculated, that by utilizing the energy of Niagara for electricity, sodium nitrate can be manufactured at a cost of not over $25 per ton—less than its present price. This figure would probably be reduced were the operations carried on on a large scale. The amount of nitrate needed for fertilizing the whole possible wheat acreage of the world would be twelve millions of tons annually; Niagara could furnish the electrical energy for the manufacture of this without sensibly diminishing its flow.

The second part of Professor Crookes' address was devoted to recent developments in chemistry and electricity. Dewar's liquefaction of hydrogen and the consequent low temperature work; Ramsay's discoveries of krypton, neon and metargon; Nasini's discovery of coronium in the volcanic gases at Pozzuoli; Marconi's application of Hertz's discovery to telegraphy without wires; Zeeman's phenomenon and the possible light it may throw on the ether; the theory of the Röntgen rays and their nature; a possible theory for the Becquerel rays emitted from uranium and its compounds, and the allied rays from thorium, and Curie's newly discovered polonium—these were all considered, and then the announcement made of a new

element discovered by Professor Crookes among the rare earths. To this the name monium is given; it was discovered by spectro-photography, its lines standing almost at the extreme end of the ultra-violet rays, and hence only visible on the photographic plate. Its atomic weight is apparently about 118. The address concluded with a short reference to the work of the Society of Psychical Research of which also Professor Crookes is President.

J. L. H.

CURRENT NOTES ON METEOROLOGY.

THE MEAN ANNUAL RAINFALL OF THE GLOBE.

IN the *American Journal of Science* for January, 1882, Loomis published the first chart of the mean annual rainfall of the globe, which has, since then, remained the accepted standard of the world. The annual amounts of rainfall were divided into five groups, and the chart was colored in five shades of blue to indicate rainfalls of (I) less than 10 inches, (II) 10 to 25 inches, (III) 25 to 50 inches, (IV) 50 to 75 inches, and (V) over 75 inches. The data at Loomis' disposal were far from complete. A revised edition of the map was published in 1889, the classification of the rainfalls remaining the same, but five different colors being used to indicate these classes, instead of the five shades of blue employed on the original map. During the years that have elapsed since Loomis' map was published, there has been a large increase in the number of rainfall observations from all parts of the world, and the vast body of material now available has been utilized by Supan in the construction of new rainfall maps. Supan's first publication, 'Die Vertheilung des Niederschlages auf der festen Erdoberfläche,' appeared a few months since (Ergänzungsheft No. 124, Petermann's Mittheilungen), and his second, 'Die jährlichen Niederschlagsmengen auf den Meeren,' has just appeared in the same journal (VIII, 1898, pp, 179–182). These articles are of great value. They give us revised charts of the mean annual and the seasonal rainfall over the lands, and also the first chart that has ever been published of the mean annual rainfall over the oceans. These are all based on the latest and best data obtainable, and will doubtless remain the standards for many years. The varying amounts of rainfall, grouped into six classes, are indicated by different colors, the heaviest rainfall being shown in blue, and the lightest in yellow.

SYMONS' BRITISH RAINFALL.

MR. SYMONS' annual volume on 'British Rainfall' for 1897 contains a noteworthy article on the 'Mean Annual Rainfall in the English Lake District,' which is a continuation of articles on the rainfall of parts of the same region, published in the volumes for 1895 and 1896. The area under discussion in the present paper embraces about 650 square miles. Records from 147 stations have been utilized, and the aggregate number of yearly records dealt with is 1,612. Two maps accompany the article, an excellent orographical map of the Lake district, and a map showing the mean annual rainfall of the district. Mr. Symons now has 3,318 rainfall observers, truly an imposing number in the little territory of the British Isles, and a body of workers which, under able leadership, is gathering a most valuable store of material. And this material, be it said, is being constantly put to use.

NOTES.

THE annual report on the 'Rainfall in South Australia and the Northern Territory in 1896,' by Sir Charles Todd, Government Astronomer of South Australia, contains an account of the great 'heat wave' of January, 1896. This 'heat wave' was one of exceptional severity. At Gundabooka Sta-